UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 10/561,658 | 02/02/2006 | Marko Hahn | 3000-0044 | 7791 |

50811 7590 06/04/2009

O"Shea Getz P.C.
1500 MAIN ST. SUITE 912
SPRINGFIELD, MA 01115

| EXAMINER | |
|---|---|
| CONWAY, THOMAS A | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2624 | |

| MAIL DATE | DELIVERY MODE |
|---|---|
| 06/04/2009 | PAPER |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. 10/561,658 | Applicant(s) HAHN ET AL. | |
|---|---|---|---|
| | Examiner THOMAS A. CONWAY | Art Unit 2624 | |

***-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --***

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *24 February 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-14 and 16-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14 and 16-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *19 December 2005 and 05 February 2007* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *12/19/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

1. Applicant's response to the last office action filed 2/24/2009 have been entered and made record of.

2. Applicant's amendment of claims (the addition of claim 21) has been entered and made record of.

### *Response to Arguments*

3. Applicant's arguments filed 2/24/2009 have been fully considered but they are not persuasive.

4. **Regarding claim 1**, Applicant argues the Examiner has misread Haan et al. (True-Motion Estimation with 3-D Recursive Search block Matching, IEEE Transactions on Circuits and Systems for Video Technology, 1993, Vol. 3, No. 5, 368-379) hereafter referred to as “Haan”, and in explanation points out firstly that

**a)** the update vector U is a function of the displacement vector D(X,t) (Remarks, p 9) only and that as shown in equations 20 and 22 of Haan, is an element of a look-up table and block counter, as used in equation 26, and is therefore a function of the candidate vector, the applicant then restates that in conclusion, the norm of U(X,t) as used in equation 26, is not a function of the candidate vector and the prediction vector. The Applicant secondly argues that

**b)** the Examiner has taken official notice that *"there are a wide variety of operations that could be used to find a test vector with the smallest error, including calculating the error of multiple test vectors, sorting them by maximum or minimum error and then appropriately selecting the desired vector by rank."* (Remarks, p 10). The Applicant states that Haan's method of selecting a vector is based on convergence and therefore would be unobvious to combine a ranking order of quality characteristics with a selection of test vectors based on ranking of quality characteristics.

5. **Regarding Applicant's argument (a):** The Examiner made reference and citation to ||U(X,t)|| representing the comparison result between the given prediction vector and its corresponding test vector, also pointing out that the quality characteristic used in Haan is e(C,X,t) (Haan, p 373, col. 1 and eq 26). The Applicant points out that U(X,t) as detailed in equations 20 and 22 are functions of a look-up table and block counter. The Examiner respectfully agrees with this reading of Haan, **however**, the Examiner would like to point out that this derivation of U(X,t) is **just one of several versions** of U(X,t) and the equations (20 and 22) pointed out by the Applicant is **just one instance of U(X,t)** that happened to be used for evaluation purposes (Haan, p 372, col. 1, ln 1-7: "final version", with relation to the 3-D RS block matcher). While equation 26 also refers to the "3-D RS block matcher", the Examiner would like to point out equations 16 and 17 which are additional derivations for the "3-D RS block-matching algorithm" (Haan, p 371, see also, col. 1, ln 28-36). There are several derivations and

determinations for U(X,t), the derivations in equations 16 and 17 shows U(X,t) as a function of both the candidate and the prediction vectors.

6. **Regarding Applicant's argument (b):** The Applicant makes note that the Examiner took official notice regarding a ranking order of quality characteristics and states that the Applicant is traversing the official notice. The Examiner respectfully disagrees. The Examiner made an obviousness rejection under 35 U.S.C. 103(a) and did not take official notice. The obviousness type rejection was made only because Haan did not **explicitly** state the terminology of "determining a ranking order" in his disclosure. While the Applicant makes mention of Haan's method and describes it as a "method of convergence", the Applicant has neglected the description as provided in the original office action, which states that "Haan states that the test vector ("candidate vector" in Haan) having a particular quality characteristic (smallest error "e(C,X,t)") is chosen as the selection vector" (Official Action, p 5, ln 5-7; See also Haan, p 369, Para 1: "displacement vector...equals the candidate vector...with the smallest error"). While Haan does not explicitly mention a ranking order, he is implicit in his description that comparison of candidate vectors' errors and then selection of the candidate vector with the smallest error inherently is the result of a ranking. In order for the smallest error to be chosen, the selected vector's error must rank as being the smallest error value. The implicit teaching of Haan renders the step of, determining a ranking order of the quality characteristics and selecting one of the selected test vectors as the selection vector from the set of test vectors based on the order of the quality characteristics, obvious.

These arguments are not persuasive and the rejection of claim 1 should be sustained.

7. **Regarding claims 2-14 and 16-18**, Applicant argues that in light of the previously presented arguments with regards to claim 1, the rejections of the instant claims are now moot. As stated above, the Applicant's arguments with regards to claim 1 were not persuasive; therefore, the rejection of the instant claims should be sustained.

8. **Regarding claim 19**, Applicant argues that the instant claim is now patentable for at least the same reasons as set forth with respect to claim 1. As stated above, the Applicant's arguments with regards to claim 1 were not persuasive; therefore, the rejection of the instant claim should be sustained.

9. **Regarding claim 20,** Applicant argues that in light of the previously presented arguments with regards to claim 19, the rejection of the instant claim is now moot. As stated above, the Applicant's arguments with regards to claim 19 were not persuasive, therefore, the rejection of the instant claims should be sustained.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

**Claims 1-14,16-20** are rejected under 35 U.S.C. 103(a) as being unpatentable over Haan et al (True-Motion Estimation with 3-D Recursive Search block Matching, IEEE

Transactions on Circuits and Systems for Video Technology, 1993, Vol. 3, No. 5, 368-379) hereafter referred to as "Haan".

11. **Regarding Claims 1, 3 and 7**, Haan discloses a method for determining a selection vector which represents a displacement vector for a displacement of an image area from a first position in a first image to a second position in a second image (page 369, col. 1; see also fig. 8), the method comprising the steps of: a) supplying a set of prediction vectors (page 369, col. 1 and eq. 2); b) supplying a set of test vectors (page 369, col. 1 and eq. 1); c) selecting at least one test vector from the set of test vectors (page 369, col. 1) and performing an image comparison between a first image area in the first image and a second image area in the second image to obtain an image comparison result wherein a position of the second image area is displaced relative to the first image area by the at least one selected test vector (page 369, col. 1and eq. 6): because the operations are done for all blocks, operation on at least one test vector ("candidate vector" in Haan) is implicit in the operation as well as the comparison result wherein a position of the second image area is displaced relative to the first image area by the at least one selected test vector (see fig. 8 as well); d) comparing the at least one selected test vector with at least one selected prediction vector to obtain at least one vector comparison result for each selected test vector (page 373, col. 1 and eq. 26) – in Haan, the test vectors ("candidate vectors") are generated by the addition of "update vectors U(X,t)" from the given prediction vector. ||U(X,t)|| represents the comparison result between the given prediction vector and its corresponding test vector. This type

of operation is a typical method of comparing vectors and is well known in the art; e) supplying at least one quality characteristic for each selected test vector from both the image comparison result obtained for each selected test vector and from the vector comparison result for each selected test vector (page 373, col. 1 and eq. 26). The quality characteristic used in Haan is e(C,X,t) but Haan also mentions that other weights can be used from both the image comparison result obtained for each selected test vector and from the vector comparison result for each selected test vector (page 369, col. 2, lines 2-10) these weights can be set according to the placement of the adjoining blocks and their resultant vectors.

Haan fails to disclose determining a ranking order of the quality characteristics and selecting one of the selected test vectors as the selection vector from the set of test vectors based on the ranking order of the quality characteristics. Haan states that the test vector ("candidate vector" in Haan) having a particular quality characteristic (smallest error "e(C,X,t)") is chosen as the selection vector. Haan does not develop the particular method of its implementation but there are a wide variety of operations that could be used to find a test vector with the smallest error, including calculating the error of multiple test vectors, sorting them by maximum or minimum error and then appropriately selecting the desired vector by rank. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include in the method as outlined by Haan, the step of determining a ranking order of the quality characteristics and selecting one of the selected test vectors as the selection vector from the set of test vectors based on the ranking order of the quality characteristics.

12. **Regarding Claim 2**, Haan discloses the method of claim 1, where one set of test vectors is assigned to each prediction vector or to one group each of the prediction vectors, where the step of comparing utilizes the test vector set to compare at least one selected test vector from the test vector set with at least one selected prediction vector (eq. 1).

13. **Regarding Claim 4**, Haan discloses the method of claim 1 in which the step of selecting at least one test vector from the set of test vectors, and performing an image comparison between a first image area in the first image and a second image area in the second image to obtain an image comparison result wherein a position of the second image area is displaced relative to the first image area by the at least one selected test vector, where this step is implemented for all the test vectors (page 369 eq. 1 and 5)

14. **Regarding Claim 5**, Haan discloses the method of claim 1 in which the step of comparing the at least one selected test vector with at least one selected prediction vector to obtain at least one vector comparison result for each selected test vector, where this step is implemented for all the prediction vectors (page 369, eq. 2).

15. **Regarding Claim 16**, Haan discloses the method of claim 1, further comprising the step of supplying a set of selection vectors as a function of a set of prediction vectors and a set of test vectors (eq. 1).

16. **Regarding Claim 17**, Haan discloses the method of claim 1, further comprising the step of storing the selection vectors as new prediction vectors (eq. 1 and 2).

17. **Regarding Claim 19**, Haan discloses all the limitations of claim 19 (see claim 1 above) and states that the process can be done iteratively (Section II, paragraph 1).

18. **Regarding Claim 6 and 20**, Haan discloses the method of claim 1 and 19 upon which claims 6 and 20 are dependent, further comprising the step of linking the image comparison result for a selected one of the test vectors and the vector comparison result for a selected one of the prediction vectors, where the quality characteristic improves the less the selected test vector and the selected prediction vector differ from each other (page 373, eq. 26).

19. **Regarding Claim 8**, Haan discloses the method of claim 1, where steps c) through f) are performed at least twice (Section II, paragraph 1), where according to step g) at least one test vector is selected based on the ranking order of the quality characteristics (see claim 1 above), and where at least one test vector in a set of

selected test vectors is generated for the subsequent image comparison in step c) (eq. 1 and 2).

20. **Regarding Claim 9**, Haan discloses the method of claim 8, where during the steps c) through f) one test vector is determined for each prediction vector, and where a set of test vectors is generated for the subsequent image comparison in step c) (eq. 5 and 6).

21. **Regarding Claim 10**, Haan discloses the method of claim 8, where from the selected test vector selected according to step g), one test vector of the set of test vectors is generated for the image comparison in step c) by vector addition with at least one modification vector (eq. 1).

22. **Regarding Claim 11**, Haan discloses the method of claim 10, where from the selected test vector selected according to step g), multiple test vectors are respectively generated by vector addition of multiple modification vectors (eq. 1).

23. **Regarding Claim 12**, Haan discloses the method of claim 11 but does not mention that with each repetition of steps c) through f), the modification vectors employed match in terms of their direction and the absolute value of the modification vectors becomes smaller in subsequent iterations of steps c) through f). Reduction of

step length is a standard feature of block-matching methods and the since each subsequent modification vectors is referenced in further iterations, their directions matching would be an obvious result. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made

24. **Regarding Claim 13**, Haan discloses the method of claim 11, where the modification vectors are a function of the determined quality characteristic supplied for the selected test vector (eq. 26).

25. **Regarding Claim 14**, Haan discloses the method of claim 13, where an absolute value of the modification vector becomes smaller as the quality characteristic improves (eq. 26).

26. **Regarding Claim 18**, Haan discloses the method of claim 1 but fails to disclose the steps of presetting or modifying the selection vectors according to a random scheme, and storing the preset or modified selection vectors as new prediction vectors. These are obvious variations of vector operations that one of ordinary skill in the art at the time the invention was made would have been aware of. Various methods of motion estimation which was known at the time of the invention implements these operations, for instance in layering image segmentation and other prediction vector block matching algorithms.

**Claim 21** is rejected under 35 U.S.C. 103(a) as being unpatentable over Haan in view of Kim (US 5,327,232).

27. **Regarding Claim 21**, parts a-e are rejected for the same reasons as stated in claim 1. Haan also discloses generating an updated set of test vectors which includes the test vector selected as the selection vector (eq. 1: CS(X,t) is the set of test vectors and includes $D^{i-1}(X,t)$ which is the test vector selected as the selection vector – see p 369, col.2, ln 2-4) ; and repeating steps a-e using the updated set of test vectors (eq. 1: as can be seen by the superscripts and the title of the operation, the operation is recursive and iterates the preceding steps) but fails to explicitly mention outputting a signal from the processor representative of the updated selection vector.

Kim, in an analogous teaching, discloses outputting a signal from the processor representative of the updated selection vector (Col. 5, ln 64-67: “will be provided to the motion detector”). Outputting the signal is an obvious conclusion in order to either store the resultant selection vector to memory for further evaluation with correspondence to future frames, as stated by Kim (Col. 5, ln 66 – Col. 6, ln 2) or to visually represent the graphic results of the estimation process.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to include in the method of Haan, the step of outputting a signal from the

processor representative of the updated selection vector, as suggested by Kim, to either store the resultant selection vector to memory for further evaluation corresponding to future frames, or to visually represent the graphic results of the estimation process.

## ***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to THOMAS A. CONWAY whose telephone number is (571)270-5851. The examiner can normally be reached on Monday through Friday 8AM - 5PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Bella can be reached on 571-272-7778. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Matthew C Bella/
Supervisory Patent Examiner, Art Unit 2624

/Thomas A. Conway/
Examiner, Art Unit 4182